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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,326	07/06/2006	Harue Nakashima	0756-7732	9757

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EXAMINER	
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ART UNIT	PAPER NUMBER
1794	

MAIL DATE	DELIVERY MODE
12/23/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/585,326	NAKASHIMA ET AL.	
	Examiner	Art Unit	
	Andrew K. Bohaty	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10-13,25,26 and 29-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10-13,25,26 and 29-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is in response to the amendment filed September 30, 2009 which amends claims 10, 12, and 25 and cancels claims 1-9, 14-24, 27, 28, and 39-48. Claims 10-13, 25, 26, and 29-38 are pending.

Response to Amendment

2. The rejection of claims 1-48 under 35 U.S.C. 102(e) as being anticipated by Hwang et al. (US 2006/0020136) as set forth in the Office action mailed June 30, 2009 is overcome to due claim amendment and claim cancellation.

3. The rejection of claims 1-3, 5, 6, 10, 11, 20, 21, 23, 24, 29, 30, 32, and 33 under 35 U.S.C. 102(b) as being anticipated by Onikubo et al. (US 2004/0151944) as set forth in the Office action mailed June 30, 2009 is overcome to due claim amendment and claim cancellation.

4. The rejection of claims 1-6, 10, 11, and 14-18 under 35 U.S.C. 102(b) as being anticipated by Tanaka et al. (US 576248) as set forth in the Office action mailed June 30, 2009 is overcome to due claim amendment and claim cancellation.

5. The rejection of claims 1, 2, 4, 5, 7, 9, 12, 13, 20, 21, 23, 24, 27, 28, 34, 35, 37, and 38 under 35 U.S.C. 102(b) as being anticipated by Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) as set forth in the Office action mailed June 30, 2009 is overcome to due claim amendment and claim cancellation.

6. The rejection of claims 1, 3, 5, 6, 10, 11, 16, and 17 under 35 U.S.C. 102(b) as being anticipated by Ballonyte et al. (Environmental and Chemical Physics, year 2002, volume 24, pages 30-34) as set forth in the Office action mailed June 30, 2009 is overcome to due claim amendment and claim cancellation.

7. The rejection of claims 3, 8, 19, 25, 26, 44, 45, 47, and 48 under 35 U.S.C. 103(a) as being unpatentable over Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) as set forth in the Office action mailed June 30, 2009 is overcome to due claim amendment and claim cancellation.

8. The rejection of claims 18, 39, 40, 42, and 43 under 35 U.S.C. 103(a) as being unpatentable over Onikubo et al. (US 2004/0151944) in view of Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) as set forth in the Office action mailed June 30, 2009 is overcome to due claim amendment and claim cancellation.

9. The rejection of claims 22, 31, and 41 under 35 U.S.C. 103(a) as being unpatentable over Onikubo et al. (US 2004/0151944) in view of Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) Lee et al. (US 2001/0046612) as set forth in the Office action mailed June 30, 2009 is overcome to due claim amendment and claim cancellation.

10. The rejection of claims 22, 36, and 46 under 35 U.S.C. 103(a) as being unpatentable over Onikubo et al. (US 2004/0151944) in view of Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) and Lee

et al. (US 2001/0046612) as set forth in the Office action mailed June 30, 2009 is overcome to due claim amendment and claim cancellation.

Response to Arguments

11. Applicant's arguments with respect to claims 10-13, 25, 26, and 29-38 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 10-13, 25, 26, and 29-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang et al. (US 2006/0020136) (hereafter “Hwang”) in view of Hosokawa (US 6,660,410) (hereafter “Hosokawa”) and Thompson et al. (US 2003/0175553) (hereafter "Thompson").

14. Regarding claims Regarding claims 10, and 11, Hwang discloses carbazole derivatives (formula (1) paragraphs [0011]-[0013] and [0042] and compounds 1-9, 12, 14, and 15 on pages 4-7). Hwang teaches in formula (1) that the phenyl group attached to the N position on the carbazoles can be substituted to contain an aryl group containing 6 to 20 carbon atoms (paragraph [0038]).

15. Hwang does not specifically teach where the N position of the carbazole group contains a biphenyl group.

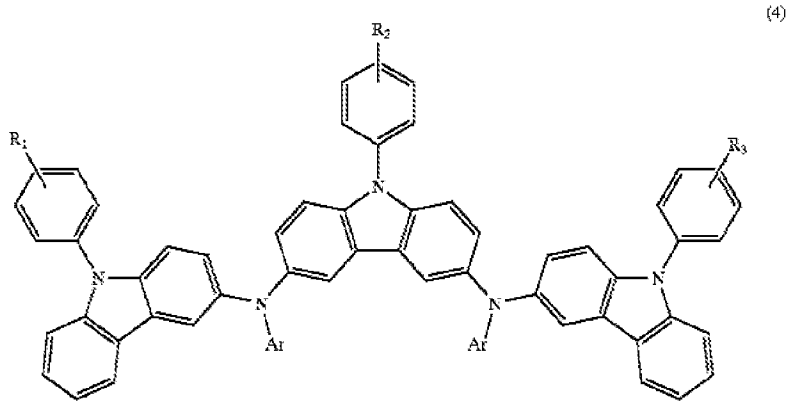
16. Hosokawa teaches carbazole derivatives that can be used for light emitting devices (column 2 lines 56-67 and column 3 lines 1-29, compounds (11) and (16)) wherein the N position of the carbazole contains a biphenyl group. Hosokawa teaches that by changing the substituent attached to the carbazole group can change the glass transition of the material and that the glass transition should be between 110 °C and 170 °C (column 6 lines 33-51). Hosokawa teaches that materials having a glass transition higher than 110 °C have a practical life span and a superior heat-resistance (column 29 lines 46-54).

17. Thompson teaches carbazole derivatives that can be used for light emitting devices. Thompson teaches that adding polyphenyl groups to the N position of carbazoles will increase the glass transition of the material and therefore increase the lifetime of the material producing light emitting devices with improved lifetimes (paragraphs [0074] and [0075]).

18. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the carbazole derivatives of Hwang so the N position of the carbazoles contained a biphenyl group. The motivation would have been to increase the glass transition temperature of the material and therefore increasing the stability of the material.

19. Regarding claims 12, 13, 25, and 26, Hwang discloses carbazole derivatives (formula (4), paragraphs [0017], [0018], and [0042] and compounds 17 and 21 on page

7, shown above) that teach the limitations of the carbazole compounds present in claims 12 and 25-28. Hwang teaches in formula (4) that the phenyl group attached to the N position on the carbazoles can be substituted to contain an aryl group containing 6 to 20 carbon atoms (paragraph [0017]).



20. Hwang does not specifically teach where the N position of the central carbazole group contains a biphenyl group.

21. Hosokawa teaches carbazole derivatives that can be used for light emitting devices (column 2 lines 56-67 and column 3 lines 1-29, compounds (11) and (16)) wherein the N position of the carbazole contains a biphenyl group. Hosokawa teaches that by changing the substituent attached to the carbazole group can change the glass transition of the material and that the glass transition should be between 110 °C and 170 °C (column 6 lines 33-51). Hosokawa teaches that materials having a glass transition higher than 110 °C have a practical life span and a superior heat-resistance (column 29 lines 46-54).

22. Thompson teaches carbazole derivatives that can be used for light emitting devices. Thompson teaches that adding polyphenyl groups to the N position of

carbazoles will increase the glass transition of the material and therefore increase the lifetime of the material producing light emitting devices with improved lifetimes (paragraphs [0074] and [0075]).

23. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the carbazole derivatives of Hwang so the N position of the central carbazole contained a biphenyl group. The motivation would have been to increase the glass transition temperature of the material and therefore increasing the stability of the material.

24. Regarding claims 29, 30, 32, 34, 35, and 37, Hwang teaches a light emitting element (Fig. 1, objects cathode, anode, and EML, paragraph [0049]) comprising of an anode (Fig. 1, anode), a cathode (Fig. 1, cathode), and a light-emitting layer between the anode and the cathode (Fig. 1, EML, paragraph [0052]), wherein the light-emitting layer comprises any of carbazoles mentioned in claims 1-19 and 25-28 and can contain additional luminescent substances (paragraphs [0024], [0025], [0027], [0037], and [0052]).

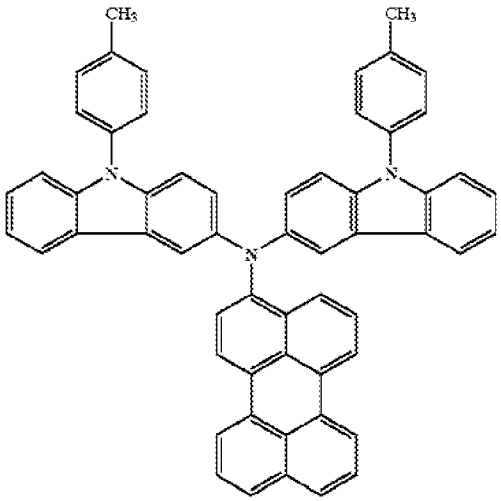
25. Regarding claims 31 and 36, Hwang teaches that any of the carbazoles taught can also be used in the hole injecting layer, which is between the light-emitting layer and the anode and is in contact with the anode (Fig. 1, EIL, paragraph [0024]-[0026]).

26. Regarding claims 33 and 38, Hwang teaches that a light-emitting device can be manufactured using the claimed light emitting element (paragraph [0076]).

27. Claims 10, 11, 29, 30, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onikubo et al. (US 2004/0151944) (hereafter “Onikubo”) in view of Hosokawa (US 6,660,410) (hereafter “Hosokawa”) and Thompson et al. (US 2003/0175553) (hereafter "Thompson").

28. Regarding claims 10 and 11, Onikubo teaches a carbazole derivative (compound A24 page 11) with the following structure.

A24



29. Onikubo does not specifically teach where the N position of the carbazole group contains a biphenyl group.

30. Hosokawa teaches carbazole derivatives that can be used for light emitting devices (column 2 lines 56-67 and column 3 lines 1-29, compounds (11) and (16)) wherein the N position of the carbazole contains a biphenyl group. Hosokawa teaches that by changing the substituent attached to the carbazole group can change the glass transition of the material and that the glass transition should be between 110 °C and 170 °C (column 6 lines 33-51). Hosokawa teaches that materials having a glass

transition higher than 110 °C have a practical life span and a superior heat-resistance (column 29 lines 46-54).

31. Thompson teaches carbazole derivatives that can be used for light emitting devices. Thompson teaches that adding polyphenyl groups to the N position of carbazoles will increase the glass transition of the material and therefore increase the lifetime of the material producing light emitting devices with improved lifetimes (paragraphs [0074] and [0075]).

32. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the carbazole derivative of Onikubo so the N positions of the carbazoles contained a biphenyl group. The motivation would have been to increase the glass transition temperature of the material and therefore increasing the stability of the material.

33. Regarding claims 29, 30, and 32, Onikubo teaches a light emitting element (Fig. 1A and 1B, objects 11, 12, 20, and 21, paragraphs [0068] and [0069]) comprising of an anode (Fig. 1A and 1B, object 11), a cathode (Fig. 1A and 1B, object 12), and a light-emitting layer between the anode and the cathode (Fig. 1A, 20, Fig. 1B, 21, paragraphs [0068] and [0069]), wherein the light-emitting layer comprises a carbazole derivative (compound A24 is an A compound, paragraph [0048] and [0049]) and can contained additional luminescent substances. Onikubo teaches that a mixture of compound A, where A24 is a carbazole, and compound B are used as a light emitting layer (paragraph [0048] and [0049]) and this layer can be in contact with the anode (Fig. 1A, 11 and 20, paragraph [0068]).

34. Regarding claim 33, Hwang teaches that these light-emitting elements can be a used in light emitting devices (paragraph [0001]).

35. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onikubo et al. (US 2004/0151944) (hereafter “Onikubo”) in view of Hosokawa (US 6,660,410) (hereafter “Hosokawa”) and Thompson et al. (US 2003/0175553) (hereafter "Thompson") as applied to claims 10, 11, 29, 30, 32, and 33 above, and further in view of Lee et al. (US 2001/0046612) (hereafter “Lee").

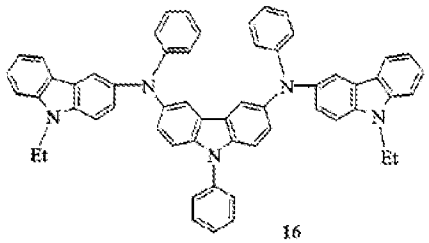
36. Regarding claim 31, Onikubo in view of Hosokawa and Thompson does not teach a light-emitting element, wherein the carbazole derivative is included between the anode and a layer having a light-emitting layer which is included in the layer including a luminescent substance.

37. Lee teaches that carbazole derivatives can be used as a hole-transporting material (paragraph [0032]) and used in a hole-transporting layer which is between the anode and the light emitting layer (paragraph [0073]) to provide an EL device with increased thermal stability (paragraph [0011]). Lee also teaches that multilayer systems that include a hole-transporting layer improve efficiency and luminance of an EL device (paragraph [0009]).

38. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the light-emitting element, of Onikubo in view of Hosokawa and Thompson, to include a carbazole containing hole-transporting layer between the light-emitting layer and the anode as taught by Lee. Since Lee teaches

carbazoles as a hole-transporting materials, the carbazole of Onikubo in view of Hosokawa and Thompson, could be used in the hole-transporting layer. The motivation would have been to produce a light-emitting element with improved efficiency and luminance.

39. Claims 12, 13, 25, 26, 34, 35, 37, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) (hereafter “Thomas”) in view of Hosokawa (US 6,660,410) (hereafter “Hosokawa”) and Thompson et al. (US 2003/0175553) (hereafter "Thompson").

40. Regarding claims 12 and 13, Thomas discloses a carbazole derivative (page 9406, compound 16) with the following structure,  16 .

Thomas does teach that N-substituent of the carbazole skeleton can be ethyl, phenyl, or fused aromatics (page 9407, left column last paragraph) and shows in compound 14 the group can be fluorene, which has very similar structure to biphenyl.

41. Thomas does not teach where the central carbazole contains biphenyl off the N position.

42. Hosokawa teaches carbazole derivatives that can be used for light emitting devices (column 2 lines 56-67 and column 3 lines 1-29, compounds (11) and (16))

wherein the N position of the carbazole contains a biphenyl group. Hosokawa teaches that by changing the substituent attached to the carbazole group can change the glass transition of the material and that the glass transition should be between 110 °C and 170 °C (column 6 lines 33-51). Hosokawa teaches that materials having a glass transition higher than 110 °C have a practical life span and a superior heat-resistance (column 29 lines 46-54).

43. Thompson teaches carbazole derivatives that can be used for light emitting devices. Thompson teaches that adding polyphenyl groups to the N position of carbazoles will increase the glass transition of the material and therefore increase the lifetime of the material producing light emitting devices with improved lifetimes (paragraphs [0074] and [0075]).

44. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the carbazole derivative of Thomas so the N position of the central carbazole contained a biphenyl group. The motivation would have been to increase the glass transition temperature of the material and therefore increasing the stability of the material.

45. Regarding claims 25 and 26, Thomas does not teach a carbazole derivative represented by applicant's formulae (5), wherein R^{22} and R^{23} are formula (6), wherein both R^{24}'s represent an aryl group having 6 to 25 carbon atoms, or a heteroaryl group having 5 to 9 carbons atoms and even more specifically phenyl groups.

46. Thomas does teach that N-substituent of the carbazole skeleton can be ethyl, phenyl, or fused aromatics (page 9407, left column last paragraph). Thomas teaches

that changing the substituent can change the hole-transporting and emitting properties of the carbazole derivative (page 9407, left column last paragraph).

47. It would have been obvious by one of ordinary skill in the art at the time the invention was made to substitute the ethyl groups at the N-substituent positions of the two terminal carbazole groups in the carbazole derivative of Thomas with phenyl groups as taught by Thomas at arrive at a carbazole derivative represent by general formula (5) wherein R^{22} and R^{23} are formula (6), wherein both R^{24}'s represent a phenyl group (an aryl group containing 6 carbon atoms). Thomas teaches that N-substituent of the carbazole skeleton can be ethyl, phenyl, or fused aromatics to tune the hole-transporting and light-emitting properties of the carbazole derivative. One of ordinary skill in the art would have been motivated to substitute the ethyl groups of the carbazole derivative, of Thomas, with phenyl groups because phenyl groups are known to be substituents at the N position of carbazole derivatives, and because it would be a simple substitution of substituents for one of ordinary skill in the art that would lead to predictable results of a carbazole derivative as a material in an EL device.

48. Regarding claims 34, 35, and 37, Thomas discloses a light-emitting element comprising an anode (ITO), a cathode (an alloy of magnesium and silver) and a light-emitting layer (carbazole derivatives) between the anode and the cathode (page 9404, right column, entire top paragraph of the column before the heading experimental section, page 9406 left column, the entire paragraph), wherein the light-emitting layer comprises a carbazole derivative, which is the luminescent substance. Thomas teaches that the layer containing any of their carbazole derivatives, which compound 16

is preferred compound, is both a light-emitting layer and a hole-transporting layer. This means the carbazole derivative is the luminescent substance in the layer (page 9404, right column, entire top paragraph of the column before the heading experimental section). Thomas teaches that the carbazole derivative layer (light-emitting layer and hole-transporting layer) are in contact with the anode (page 9406 left column, the entire paragraph).

49. Regarding claim 38, Thomas teaches that light-emitting elements (electroluminescent devices) can be a used in light emitting devices (flat-panel displays and LEDs) (page 9404 left column first paragraph).

50. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) (hereafter “Thomas”) in view of Hosokawa (US 6,660,410) (hereafter “Hosokawa”) and Thompson et al. (US 2003/0175553) (hereafter "Thompson") as applied to claims 10, 11, 29, 30, 32, and 33 above, and further in view of Lee et al. (US 2001/0046612) (hereafter “Lee").

51. Regarding claim 36, Thomas in view of Hosokawa and Thompson does not teach a light-emitting element, wherein the carbazole derivative is included between the anode and a layer having a light-emitting layer which is included in the layer including a luminescent substance.

52. Lee teaches that carbazole derivatives can be used as a hole-transporting material (paragraph [0032]) and used in a hole-transporting layer which is between the

anode and the light emitting layer (paragraph [0073]) to provide an EL device with increased thermal stability (paragraph [0011]). Lee also teaches that multilayer systems that include a hole-transporting layer improve efficiency and luminance of an EL device (paragraph [0009]).

53. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the light-emitting element, of Thomas in view of Hosokawa and Thompson, to include a carbazole containing hole-transporting layer between the light-emitting layer and the anode as taught by Lee. Since Lee teaches carbazoles as a hole-transporting materials, the carbazole of Onikubo in view of Hosokawa and Thompson, could be used in the hole-transporting layer. The motivation would have been to produce a light-emitting element with improved efficiency and luminance.

Conclusion

54. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

55. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

56. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 7:30 am to 5:00 pm EST and every other Friday from 7:30 am to 4 pm EST.

57. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

58. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K. B./
Andrew K. Bohaty
Patent Examiner, Art Unit 1794

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1794